Content

Course Code	Course Name	Semester	Theory	Practice	Lab	Credit	ECTS
IND304	Modeling and Simulation	6	3	0	0	3	5

Prerequisites	IND373/ING242
Admission Requirements	IND373/ING242
Language of Instruction	Turkish
Course Type	Compulsory
Course Level	Bachelor Degree
Objective	Modelling and simulation are privileged tools for improving the performance of industrial systems. Thanks to the theoretical and practical knowledge gained in this compulsory course, students will be able to effectively apply modelling and simulation as a decision-making tool in industrial problems of enterprises (especially in problems based on complex systems). In this context, the objectives of the course are determined as follows: - To provide students with basic knowledge about modelling and simulation and how modelling and simulation can be used in decision making. - To provide students with an overview of how businesses can apply modelling and simulation approaches to industrial problems (especially those based on complex systems) - To enable students to learn simulation tools on computer
Content	Week 1: Introduction to the course: System, model, simulation - Learning to live with randomness and uncertainty - Computer and simulation Week 2: System, input, output and state concepts - Classification of systems - System approach and analysis - Brief examination of production and service systems and their problems Week 3: Basic modelling concepts - Modelling process - Modelling methods - Properties and benefits of simulation - Queuing and waiting concepts Week 4: Introduction of Anylogic software Week 5: Monte Carlo simulation - Creation of random numbers - Simulation process - Simulation techniques Week 6: Probability concepts in simulation - Modelling of data Week 7: Analysing real problems by manual simulation Week 8 Midterm Exam Week 9: Designing a simulation project - Structuring a real simulation project Week 10: Chi-square test - Kolmogorov Smirnov test Week 11: Analysing real problems by manual simulation Week 12: Checking, validating and analysing simulation results Week 13: Examination and application of simulation case studies Week 14: Project presentations
References	1. Kelton, W.D., Law, A.M., "Simulation Modeling and Analysis", McGraw Hill, 2007. 2. Erkut, H., "Simulation Approach in Management", İrfan Publishing, Istanbul, 2000. Anylogic software for simulation: https://www.anylogic.com/use-of-simulation/

Theory Topics

Week	Weekly Contents
1	Introduction to the course: System, model, simulation - Learning to live with randomness and uncertainty - Computers and simulation
2	System, input, output and state concepts - Classification of systems - System approach and analysis - Brief review of production and service systems and their problems
3	Basic modeling concepts - Modeling process - Modeling methods - Features and benefits of simulation - Queuing and waiting concepts
4	Introduction of Anylogic software
5	Monte Carlo simulation - Generation of random numbers - Simulation process - Simulation techniques
6	Probability concepts in simulation - Modeling data
7	Analyzing real problems with manual simulation
8	Midterm Exam
9	Designing a simulation project - Structuring a real simulation project
10	Chi-square test - Kolmogorov Smirnov test
11	Analyzing real problems with manual simulation
12	Checking, validating and analyzing simulation results

Week	Weekly Contents
13	Examination and application of simulation case studies
14	Project presentations